the heart, previously detached from its venous sinus, the auricles (and ventricle) will either beat slower or stop altogether, according to the size of the piece removed. By cutting transversely through the auricles, the lower part of them with the attached ventricle will remain at rest definitely, unless artificially irritated. But by cutting through the auriculo-ventricular junction, *i. e.*, through the ganglia existing in the flaps forming the auriculo-ventricular valves, the ventricle will again commence pulsating, but only for a short time. When once at rest, fresh pulsations can be started by any stimulus. But if the ventricular apex, which contains no ganglia, is isolated, every stimulus evokes merely a single contraction. Extirpation of the valve-flaps containing the ganglia excludes the ventricle from further contractions. They can be extirpated by opening the lower part of the ventricle, without otherwise disturbing the action of the heart.

Löwit's views and explanations may be thus reproduced. The systole commences always in the venous sinus, as inspection shows. The sinus ganglion is, in all probability, the organ starting the impulse. The ganglia in the interauricular septum suffice for the maintenance of the auricular pulsations, but since the detached auricle beats slower, it is to be assumed that they are less irritable than the ganglia of the sinus in which the impulse is started. There is no doubt a summation of nerve energy as the impulse reaches the interauricular ganglia. The ganglia at the base of the ventricle cannot start pulsations anatomically ; they must be stimulated from above. They evidently serve to transmit the nerve impulse to the ventricular musculature, as is shown by the result of their extirpation. Moreover, it has been shown (Engelmann, Bernstein) that the contraction-wave is delayed in its passage from auricle to ventricle.

THE CHEYNE-STOKES PHENOMENON.—By some casual observations Luchsinger learned that the above modification of the respiratory movements could be induced in the frog by asphyxia. Further researches which he has published together with Dr. Sokolow in Pflüger's Arch. (vol. xxiii, H. 5 and 6, p. 283), have yielded some results of high interest as regards the irritability of nerve centres. The animal's brain was asphyxiated by ligature of the two aortas. The loss of irritability follows in from one to eight hours, *the quicker the higher the temperature of the animal.*

The function of the brain is annihilated first only ; subsequently

the cord loses its reflex excitability. The recovery after removal of the ligature occurs in the reverse order. Before the reflex excitability is wholly lost the Cheyne-Stokes mode of breathing can be observed; likewise on removal of the ligature it reappears immediately after the return of spinal reflexes. On watching the inspiratory movements of the larynx, it can be seen that a few inspirations occur in quick succession, followed by a long pause. During the course of asphyxia the number of inspirations in such a *group* diminishes while the pauses intervening between the groups lengthen in duration until the respiration ultimately stops. The reverse order is witnessed during recovery. The Cheyne-Stokes phenomenon does not depend on rhythmic changes in the width of the vessels as Filehne has supposed. This is indeed proven by its very occurrence while the cranial vessels are shut off. Moreover, the manometer failed to reveal any corresponding changes in the blood pressure of the frog. The phenomenon is, of course, independent of the cerebrum, and occurs just as well after its extirpation. It can occur also after destruction of the cord below the medulla and after section of the vagi.

The cause of the Cheyne-Stokes mode of breathing, Luchsinger refers to a diminished excitability of the respiratory centres, while acted upon by an intense stimulus. According to this view it seems easy to explain how the gradual increase of the stimulus—the venosity of the blood—during the narcosis of mammals, which reduces the excitability of the medulla, can produce the phenomenon, as, indeed, it does occur during the narcosis of morphia, ether, chloral and alcohol. In frogs, however, the mere narcosis is not sufficient, although the anæsthesia reduces the irritability of the nerve centres, and in consequence thereof the energy of the respiratory movements; the breathing through the skin of the frog prevents a sufficient venosity of the blood. But on substituting another stimulus, the action of picrotoxin or strychnia, the Cheyne-Stokes phenomenon can be produced in the narcotized frog.

A phenomenon similar to the Cheyne-Stokes breathing has been observed by Luciani, Rossbach and others in the frog's heart when filled with serum. It is the appearance of beats in a group with long pauses between successive groups. By analysis of the conditions the authors refer this periodicity likewise to diminished irritability and increased stimulus.

The details of Luchsinger's plausible, and, it seems to us, well-

founded explanation, are the following: By deprivation of arterial blood the nerve centres lose gradually their excitability, since the accumulated store of complex molecules, whose decomposition furnishes the force, is gradually exhausted. These and the following statements apply, according to Luchsinger, equally to all irritable tissues. The stimulus, for instance, the accumulation of waste products, must hence increase before it can evoke a response. Every *discharge*, however, of a nerve centre leaves it for a short time in a more irritable condition, as can be proven by numerous physiological instances. Hence, the first discharge of energy is followed by a group of discharges until the fatigue becomes too great. The next series of discharges can only occur, hence, by the time the stimulus has increased to a sufficient extent.

INNERVATION OF THE UTERUS.—Experiments on the above topic have been performed by Dr. G. Reni (*Pflüger's Archiv*, vol. xxiii., H. 1 and 2, p. 68) by means of the method of nerve section, a plan hitherto but little employed in connection with the uterus. Instead of watching the uncertain results of experimental irritation, the author observed whether the processes of conception, gestation and delivery, were interfered with by division of the sympathetic or the sacral nerves. As a result, he found that the functions of the uterus are not sensibly disturbed by cutting off its entire nerve supply. Extirpation even of the ganglia in the plexus surrounding the cervix, the *ganglion cervicale*, did not interfere with the uterine functions.

THE IDIO-MUSCULAR CONTRACTION is the subject of a posthumous paper by Lautenbach in the *Philadelphia Medical Times* (Sept. 25, 1880). He claims with Schiff that this form of contraction is the only positive evidence of independent muscular irritability, and that it is not, according to some German views, merely the remnant of a general muscular contraction. His experiments were made with saponin which, when dropped upon muscle in a solution of one per cent., produced a localized idio-muscular contraction merely. If the solution is carefully injected into the vessels, the muscle is often thrown into a state in which no stimulus whatever can evoke a general contraction, while tapping readily produces a limited idio-muscular ridge. He considers the effect of saponin upon muscles as identical with rigor mortis, and the latter but the last idio-muscular contraction